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FIND RESULTS: 23 expectations were found
containing the term(s): **"determine, through investigation using a variety of tools"**
within: **Gr.7, Gr.8, Gr.9, Gr.10, Gr.11, Gr.12**
within: **Mathematics**

Gr.7 Mathematics---Measurement

Measurement Relationships

- ☐ **7m37 SQC2005** – determine, through investigation using a variety of tools (e.g., concrete materials, dynamic geometry software) and strategies, the relationship for calculating the area of a trapezoid, and generalize to develop the formula [i.e., Area = (sum of lengths of parallel sides x height) ÷ 2] (Sample problem: Determine the relationship between the area of a parallelogram and the area of a trapezoid by composing a parallelogram from congruent trapezoids.);
- ☐ **7m40 SQC2005** – determine, through investigation using a variety of tools and strategies (e.g., decomposing right prisms; stacking congruent layers of concrete materials to form a right prism), the relationship between the height, the area of the base, and the volume of right prisms with simple polygonal bases (e.g., parallelograms, trapezoids), and generalize to develop the formula (i.e., Volume = area of base x height) (Sample problem: Decompose right prisms with simple polygonal bases into triangular prisms and rectangular prisms. For each prism, record the area of the base, the height, and the volume on a chart. Identify relationships.);
- ☐ **7m41 SQC2005** – determine, through investigation using a variety of tools (e.g., nets, concrete materials, dynamic geometry software, Polydrons), the surface area of right prisms;

Gr.7 Mathematics---Geometry and Spatial Sense

Geometric Relationships

- ☐ **7m51 SQC2005** – determine, through investigation using a variety of tools (e.g., dynamic geometry software, concrete materials, geoboard), relationships among area, perimeter, corresponding side lengths, and corresponding angles of congruent shapes (Sample problem: Do you agree with the conjecture that triangles with the same area must be congruent? Justify your reasoning.);

Location and Movement

- ☐ **7m57 SQC2005** – determine, through investigation using a variety of tools (e.g., pattern blocks, Polydrons, grid paper, tiling software, dynamic geometry software, concrete materials), polygons or combinations of polygons that tile a plane, and describe the transformation(s) involved.

Gr.8 Mathematics---Measurement

Measurement Relationships

- ☐ **8m35 SQC2005** – determine, through investigation using a variety of tools (e.g., cans and string, dynamic geometry software) and strategies, the relationships for calculating the circumference and the area of a circle, and generalize to develop the formulas [i.e., Circumference of a circle = π x diameter; Area of a circle = π x (radius)^2] (Sample problem: Use string to measure the circumferences and the diameters of a variety of cylindrical cans, and investigate the ratio of the circumference to the diameter.);
- ☐ **8m37 SQC2005** – determine, through investigation using a variety of tools and strategies (e.g., generalizing from the volume relationship for right prisms, and verifying using the capacity of thin-walled cylindrical containers), the relationship between the area of the base and height and the volume of a cylinder, and generalize to develop the formula (i.e., Volume = area of base x height);

Gr.8 Mathematics---Geometry and Spatial Sense

Geometric Relationships

- ☐ **8m46 SQC2005** – determine, through investigation using a variety of tools (e.g., dynamic geometry software, concrete materials, geoboard), relationships among area, perimeter, corresponding side lengths, and corresponding angles of similar shapes (Sample problem: Construct three similar rectangles, using grid paper or a geoboard, and compare the perimeters and areas of the rectangles.);

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☐ **8m47** **SQC2005** – determine, through investigation using a variety of tools (e.g., dynamic geometry software, concrete materials, protractor) and strategies (e.g., paper folding), the angle relationships for intersecting lines and for parallel lines and transversals, and the sum of the angles of a triangle;

Gr.12 Foundations for College Mathematics---A. MATHEMATICAL MODELS MAP 4C

1. Solving Exponential Equations

☐ **MM1.03** **CR2007** 1.3 determine, through investigation using a variety of tools (e.g., calculator, paper and pencil, graphing technology) and strategies (e.g., patterning; finding values from a graph; interpreting the exponent laws), the value of a power with a rational exponent (i.e., $x^{m/n}$, where x > 0 and m and n are integers) Sample problem: The exponent laws suggest that $4^{1/2} \times 4^{1/2} = 4^1$. What value would you assign to $4^{1/2}$? What value would you assign to $27^{1/3}$? Explain your reasoning. Extend your reasoning to make a generalization about the meaning of $x^{1/n}$, where x > 0 and n is a natural number.

Gr.12 Foundations for College Mathematics---C. GEOMETRY AND TRIGONOMETRY MAP 4C

2. Investigating Optimal Dimensions

☐ **GT2.02** **CR2007** 2.2 determine, through investigation using a variety of tools (e.g., calculators, dynamic geometry software, manipulatives) and strategies (e.g., modelling; making a table of values; graphing), the optimal dimensions of a two-dimensional shape in metric or imperial units for a given constraint (e.g., the dimensions that give the minimum perimeter for a given area) Sample problem: You are constructing a rectangular deck against your house. You will use 32 ft of railing and will leave a 4-ft gap in the railing for access to stairs. Determine the dimensions that will maximize the area of the deck.

☐ **GT2.03** **CR2007** 2.3 determine, through investigation using a variety of tools and strategies (e.g., modelling with manipulatives; making a table of values; graphing), the optimal dimensions of a right rectangular prism, a right triangular prism, and a right cylinder in metric or imperial units for a given constraint (e.g., the dimensions that give the maximum volume for a given surface area) Sample problem: Use a table of values and a graph to investigate the dimensions of a rectangular prism, a triangular prism, and a cylinder that each have a volume of 64 cm3 and the minimum surface area

Gr.11 Foundations for College Mathematics---Mathematical Models MBF 3C

Connecting Graphs and Equations of Exponential Relations

☐ **MM2.01** **CR2006** – determine, through investigation using a variety of tools and strategies (e.g., graphing with technology; looking for patterns in tables of values), and describe the meaning of negative exponents and of zero as an exponent;

Gr.11 Functions---Exponential Functions MCR 3U

Representing Exponential Functions

☐ **EF1.02** **CR2006** – determine, through investigation using a variety of tools (e.g., calculator, paper and pencil, graphing technology) and strategies (e.g., patterning;finding values from a graph;interpreting the exponent laws), the value of a power with a rational exponent (i.e., x, where x >0 and m and n are integers) (Sample problem:The exponent laws suggest that $4^{1/2} \times 4^{1/2} = 4^1$ .What value would you assign to $4^{1/2}$? What value would you assign to $27^{1/3}$? Explain your reasoning. Extend your reasoning to make a generalization about the meaning of $x^{1/n}$,where x > 0 and n is a natural number.);

Gr.12 Mathematics for College Technology---D. APPLICATIONS OF GEOMETRY MCT 4C

1. Modelling With Vectors

☐ **AG1.05** **CR2007** 1.5 determine, through investigation using a variety of tools (e.g., graph paper, technology) and strategies (i.e., head-to-tail method; parallelogram method; resolving vectors into their vertical and horizontal components), the sum (i.e., resultant) or difference of two vectors

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3. Solving Problems Involving Circle Properties

- ☐ **AG3.03** **CR2007** 3.3 determine, through investigation using a variety of tools (e.g., dynamic geometry software), properties of the circle associated with chords, central angles, inscribed angles, and tangents (e.g., equal chords or equal arcs subtend equal central angles and equal inscribed angles; a radius is perpendicular to a tangent at the point of tangency defined by the radius, and to a chord that the radius bisects) Sample problem: Investigate, using dynamic geometry software, the relationship between the lengths of two tangents drawn to a circle from a point outside the circle.

Gr.12 Calculus and Vectors---C. GEOMETRY AND ALGEBRA OF VECTORS MCV 4U

3. Describing Lines and Planes Using Linear Equations

- ☐ **GA3.03** **CR2007** 3.3 determine, through investigation using a variety of tools and strategies (e.g., modelling with cardboard sheets and drinking straws; sketching on isometric graph paper), different geometric configurations of combinations of up to three lines and/or planes in three-space (e.g., two skew lines, three parallel planes, two intersecting planes, an intersecting line and plane); organize the configurations based on whether they intersect and, if so, how they intersect (i.e., in a point, in a line, in a plane)

Gr.9 Foundations of Mathematics---Measurement and Geometry MFM 1P

Investigating and Applying Geometric Relationships

- ☐ **MG3.01** **SQC2005** – determine, through investigation using a variety of tools (e.g., dynamic geometry software, concrete materials), and describe the properties and relationships of the interior and exterior angles of triangles, quadrilaterals, and other polygons, and apply the results to problems involving the angles of polygons (Sample problem:With the assistance of dynamic geometry software, determine the relationship between the sum of the interior angles of a polygon and the number of sides. Use your conclusion to determine the sum of the interior angles of a 20-sided polygon.);
- ☐ **MG3.02** **SQC2005** – determine, through investigation using a variety of tools (e.g., dynamic geometry software, concrete materials), and describe the properties and relationships of the angles formed by parallel lines cut by a transversal, and apply the results to problems involving parallel lines (e.g., given a diagram of a rectangular gate with a supporting diagonal beam, and given the measure of one angle in the diagram, use the angle properties of triangles and parallel lines to determine the measures of the other angles in the diagram);

Gr.12 Advanced Functions---D. CHARACTERISTICS OF FUNCTIONS MHF 4U

1. Understanding Rates of Change

- ☐ **CF1.08** **CR2007** 1.8 determine, through investigation using a variety of tools and strategies (e.g., using a table of values to calculate slopes of secants or graphing secants and measuring their slopes with technology), the approximate slope of the tangent to a given point on the graph of a function (e.g., quadratic, exponential, sinusoidal) by using the slopes of secants through the given point (e.g., investigating the slopes of secants that approach the tangent at that point more and more closely), and make connections to average and instantaneous rates of change

Gr.9 Principles of Mathematics---Measurement and Geometry MPM 1D

Investigating and Applying Geometric Relationships

- ☐ **MG3.01** **SQC2005** – determine, through investigation using a variety of tools (e.g., dynamic geometry software, concrete materials), and describe the properties and relationships of the interior and exterior angles of triangles, quadrilaterals, and other polygons, and apply the results to problems involving the angles of polygons (Sample problem:With the assistance of dynamic geometry software, determine the relationship between the sum of the interior angles of a polygon and the number of sides. Use your conclusion to determine the sum of the interior angles of a 20-sided polygon.);

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☐ **MG3.02** – determine, through investigation using a variety of tools (e.g., dynamic geometry software, paper folding), and describe some properties of polygons (e.g., the figure that results from joining the midpoints of the sides of a quadrilateral is a parallelogram; the diagonals of a rectangle bisect each other; the line segment joining the midpoints of two sides of a triangle is half the length of the third side), and apply the results in problem solving (e.g., given the width of the base of an A-frame tree house, determine the length of a horizontal support beam that is attached half way up the sloping sides);
SQC2005

Gr.9 Mathematics Transfer---Measurement and Geometry MPM 1H

Investigating and Applying Geometric Relationships

☐ **MG2.01** – determine, through investigation using a variety of tools (e.g., dynamic geometry software, paper folding), and describe some properties of polygons (e.g., the figure that results from joining the midpoints of the sides of a quadrilateral is a parallelogram; the diagonals of a rectangle bisect each other; the line segment joining the midpoints of two sides of a triangle is half the length of the third side), and apply the results in problem solving (e.g., given the width of the base of an A-frame tree house, determine the length of a horizontal support beam that is attached half way up the sloping sides);
CR2006